Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of Petition of WorldCom, Inc. Pursuant To Section 252 (e)(5) of the Communications Act for Expedited Preemption of the Jurisdiction of the Virginia State Corporation Commission Regarding Interconnection Disputes With Verizon Virginia, Inc., and for Expedited Arbitration	)	CC Docket No. 00-218
In the Matter of Petition of Cox Virginia Telecom, Inc. Pursuant to Section 252 (e)(5) of the Communications Act for Preemption Of the Jurisdiction of the Virginia State Corporation Commission Regarding Interconnection Disputes with Verizon Virginia, Inc. and for Arbitration	)	CC Docket No. 00-249
In the Matter of Petition of AT&T Communications Virginia Inc., Pursuant to Section 252 (e)(5) of the Communications Act for Preemption of the Jurisdiction of the Virginia Corporate Commission Regarding Interconnection Disputes with Verizon Virginia, Inc.	)	CC Docket No. 00-251

SURREBUTTAL TESTIMONY OF TERRY L. MURRAY

ON BEHALF OF AT&T AND WORLDCOM, INC.

SEPTEMBER 21, 2001

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Attachment A: Full text of chapters by William J. Baumol and Richard N. Clarke (Chapters 14 and 15, respectively) in J. Alleman and E. Noam, eds., *The New Investment Theory of Real Options and Its Implications for Telecommunications Economics*, 1999.

I. INTRODUCTION AND SUMMARY

Q. PLEASE STATE YOUR NAME, TITLE AND BUSINESS ADDRESS.

A. My name is Terry L. Murray. I am President of the consulting firm Murray & Cratty, LLC. My business address is 227 Palm Drive, Piedmont, CA 94610.

Q. HAVE YOU PREVIOUSLY TESTIFIED IN THIS PROCEEDING?

A. Yes, I filed both direct and rebuttal testimony on behalf of AT&T Communications of Virginia, Inc.,[1] ("AT&T") and WorldCom, Inc. ("WorldCom"). Exhibit TLM-1 to my direct testimony provides a summary of my qualifications and experience.

Q. WHAT IS THE PURPOSE OF YOUR SURREBUTTAL TESTIMONY?

A. AT&T and WorldCom have asked me to review and respond to the economic and policy positions presented in the rebuttal testimony filed by Verizon Virginia, Inc. ("Verizon VA" or "Verizon"). In particular, I will respond to the rebuttal testimony of Verizon witnesses Dr. Hausman, Dr. Shelanski and, in part, Dr. Tardiff.[2]

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1 This surrebuttal testimony is presented on behalf of AT&T Communications of Virginia, Inc., TCG Virginia, Inc., ACC National Telecom Corp., MediaOne of Virginia and MediaOne Telecommunications of Virginia, Inc. (together, "AT&T").

2 I will address those aspects of Dr. Tardiff's rebuttal testimony that pertain to the application of economic theory to cost modeling; AT&T/WorldCom witness Mr. Brian F. Pitkin addresses specific modeling issues.

In Section II of my surrebuttal testimony, I will address the manner in which Drs. Hausman and Shelanski have misapplied real options theory. I will show that Verizon's positions in this proceeding are largely ones that the Commission has already rejected, finding instead that unbundled network element ("UNE") prices based on Total Element Long Run Incremental Cost ("TELRIC") calculated using economic depreciation and risk-adjusted cost of capital assumptions fully compensate incumbents for all relevant risks. Moreover, a full consideration of options values would have to consider the options associated with a new entrant's investment decisions and could well lead to a conclusion that prices even lower than TELRIC-based prices are necessary to encourage efficient investment decisions.

In Section III, I will discuss several problems with Dr. Tardiff's contentions concerning the discrepancies between the costs that the Synthesis Model[3] produces and the costs that "real world" competitors would incur. I will demonstrate that his proposed validation tests of the Synthesis Model are inappropriate benchmarks for Verizon's forward-looking economic costs. I will explain why his critique of the manner in which the Synthesis Model treats spare capacity costs is incorrect, particularly as a basis for cost recovery from current

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3 Throughout my surrebuttal testimony, my use of the phrase Synthesis Model will refer to the UNE-compliant version of that model that AT&T and WorldCom have used to estimate UNE costs in this arbitration.

customers. Finally, I will identify discrepancies between Dr. Tardiff's claims concerning switching discounts and the "real world" conditions on which he places such emphasis.

In Section IV, I will respond to Dr. Shelanski's rebuttal concerning the manner in which AT&T and WorldCom have modeled non-recurring costs. Many of his criticisms concern issues that I already addressed at length in my rebuttal testimony; therefore, I will merely highlight in this surrebuttal testimony the basis for my disagreement with Dr. Shelanski about the distinction between recurring and non-recurring costs and the economic and policy considerations that should guide cost recovery decisions.

Finally, in Section V, I will briefly address Dr. Shelanski's rebuttal concerning switching rate design. It appears that Dr. Shelanski and I actually agree on the fundamental principle that rate design should reflect cost causation and that our disagreement stems from different views of the extent to which Verizon's switching costs are traffic-sensitive. AT&T/WorldCom witness Ms. Catherine E. Pitts addresses the cost issue in her concurrently filed surrebuttal testimony.

II. PROPER APPLICATION OF REAL OPTIONS THEORY TO THE FACTS OF THIS ARBITRATION DOES NOT SUPPORT A "MARKUP" ABOVE THE UNE PRICES THAT AT&T AND WORLDCOM HAVE DERIVED USING THE SYNTHESIS MODEL.

Q. BOTH DR. HAUSMAN AND DR. SHELANSKI ALLEGE THAT THE UNE PRICES PROPOSED BY AT&T AND WORLDCOM ARE TOO LOW BECAUSE COSTS CALCULATED USING THE MODIFIED SYNTHESIS MODEL DO NOT REFLECT THE "OPTION VALUE" OF DEFERRING INVESTMENT.[4] DO YOU AGREE?

A. No, I disagree with Drs. Hausman and Shelanski for several reasons.

- First, and most important, Drs. Hausman and Shelanski have proposed an approach to UNE pricing that will stifle local competition entirely where facilities-based entry is not a viable alternative, such as provision of services to residential customers, and elsewhere could lead new entrants to commit prematurely, and at a substantial social cost, to building facilities that needlessly and wastefully duplicate the facilities that incumbent local exchange carriers such as Verizon already have in place. In fact, in the very publication that Dr. Hausman misleadingly cites in his rebuttal testimony, Dr. William J. Baumol notes that Dr. Hausman's recommendations of an increase to TELRIC-based prices to reflect options values are those that would result from a "superficial consideration of the matter" and that a more careful and systematic application of options value

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4 Hausman Rebuttal at 9; Shelanski Rebuttal at 9-11.

theory could lead to the opposite result—that is, to a recommendation that UNE prices be set *lower* than would otherwise be required under a strict application of TELRIC pricing principles.[5]

- Second, the Hausman/Shelanski position reflects incorrect arguments that this Commission already rejected in its *Local Competition First Report and Order*.[6] Nothing has changed since 1996 that would warrant a re-examination of the Commission's prior finding that there is no basis for applying the type of markup to TELRIC-based prices that Dr. Hausman proposes.
- Third, the Hausman/Shelanski recommendations reflect incorrect assumptions concerning the basis for the cost model results that AT&T and WorldCom have submitted in this arbitration. Correcting these assumptions eliminates the supposed justification for an additional markup in UNE prices above the costs that AT&T and WorldCom have calculated.

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5 William J. Baumol, "Option Value Analysis and Telephone Access Charges," in J. Alleman and E. Noam, eds., *The New Investment Theory of Real Options and its Implications for Telecommunications Economics*, 1999, at 218 (hereafter, Baumol, 1999).

6 First Report and Order, *In the Matter of Implementation of the Local Competition Provisions in the Telecommunications Act of 1996*, 11 FCC Rcd 15499, 15874 (1996) (hereafter, *Local Competition First Report and Order*).

Q. IN YOUR PREVIOUS RESPONSE, YOU INDICATED THAT DR. HAUSMAN HAS MISLEADINGLY CITED DR. BAUMOL. WHAT IS THE BASIS FOR YOUR STATEMENT?

A. Dr. Hausman has strung together selective and incomplete quotations from Dr. Baumol, taken out of context, to give the impression that Dr. Baumol would now endorse the view that TELRIC-based pricing for UNEs is too low. Yet, as I explained in my prior answer, the bottom-line conclusion of Dr. Baumol's chapter is that TELRIC-based prices may be *higher* than the prices that would result from a reasoned application of options theory.

Dr. Hausman claims that "*Professor Baumol* now states that a cost component in the investment decision has been overlooked, 'so that the total costs of such decisions (and hence their appropriate price) is normally underestimated.'"[7] As the Commission can see by reviewing the full text of the Baumol chapter, which I have included in Attachment A, the paragraph from which Dr. Hausman quotes in part begins "[i]n short, one can characterize the pertinent part of the new analysis as follows." As this text makes clear, Dr. Baumol was not presenting his own opinion; instead, he was characterizing the new analysis that he described, in the preceding paragraph to the one quoted, as "stemming from the work of Dixit and Pindyck." Similarly, the remaining sentences that Dr. Hausman quotes from Dr. Baumol's chapter in the Alleman and

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7 Hausman Rebuttal at 10, emphasis supplied, *citing* Baumol, 1999, at 215.

Noam volume are taken from a paragraph that begins "*Dixit and Pindyck note...*,"[8] and also constitute Dr. Baumol's characterization of options theory. He then goes on to discuss—and reject—an overly simplistic application of the theory to telecommunications pricing. In short, nothing in Dr. Baumol's chapter suggests that he personally agrees with Dr. Hausman's recommendations and, as I will discuss further below, he actually comes to a very different conclusion.

A. VERIZON'S APPLICATION OF REAL OPTIONS THEORY TO UNE PRICING WOULD LIKELY DECREASE, RATHER THAN INCREASE, SOCIAL WELFARE.

Q. DR. HAUSMAN ARGUES THAT THE COSTS THAT AT&T AND WORLDCOM HAVE CALCULATED USING THE SYNTHESIS MODEL WOULD HAVE TO BE MARKED UP BY A FACTOR OF BETWEEN 1.97 TO 2.20 TO REFLECT THE EFFECT OF SUNK AND IRREVERSIBLE INVESTMENTS.[9] IS DR. HAUSMAN CORRECT?

A. No. Dr. Hausman bases his recommendation on the faulty premises that TELRIC-based pricing for UNEs will lead both Verizon and its competitors to underinvest because (1) Verizon will know that it cannot recover its full investment costs through UNE prices and (2) competitors will receive a subsidy equal to the value of the free option that they receive to use Verizon's facilities, rather than to build their own.[10] Both of these premises imply, incorrectly, that

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8 Baumol, 1999, at 216 (emphasis supplied).

9 Hausman Rebuttal at 19.

10 Hausman Rebuttal at 9.

TELRIC-based pricing for UNEs does not reflect the full cost to Verizon of building facilities. The reverse is true. That is, as the Commission found in its *Local Competition First Report and Order*, properly calculated TELRIC captures all relevant investment costs, including the costs associated with sunk and irreversible investments. In the Commission's words:

> We disagree with the conclusion that, when there are mostly sunk costs, forward-looking economic costs should not be the basis for pricing interconnection elements. The TELRIC of an element has three components, the operating expenses, the depreciation cost, and the appropriate risk-adjusted cost of capital. We conclude that an appropriate calculation of TELRIC will include a depreciation rate that reflects the true changes in economic value of an asset and a cost of capital that appropriately reflects the risks incurred by an investor. Thus, even in the presence of sunk costs, TELRIC-based prices are an appropriate pricing methodology.[11]

Q. IS THERE ANY OTHER REASON WHY DRS. HAUSMAN AND SHELANSKI ARE MISTAKEN IN CONCLUDING THAT TELRIC-BASED PRICING WOULD LEAD VERIZON TO UNDERINVEST?

A. Yes. The Hausman/Shelanski argument concerning Verizon's investment incentives presumes that competitors' demand for UNEs drives Verizon's investment decisions.[12] That is simply false. Verizon makes investments to serve *retail* demand, in part to meet its "carrier of last resort" ("COLR") obligations.

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11 *Local Competition First Report and Order* at ¶ 703.

Verizon will make these investments regardless of whether UNE prices incorporate the options values that Dr. Hausman contends are missing from the prices that AT&T and WorldCom have proposed. If UNE-based competitors win the business of former Verizon retail customers, Verizon can provision UNEs to those competitors using the same plant that Verizon had constructed to meet the retail demand. Thus, Verizon will rarely, if ever, need to make investments solely to serve UNE demand.

Verizon makes investments currently even though Verizon's *retail* customers are the beneficiaries of precisely the type of free option that Dr. Hausman ascribes to competitors—that is, Verizon's retail customers have the right, but not the obligation, to purchase Verizon's services.[13] If anything, it is the combination of this option with Verizon's COLR obligation that puts Verizon at risk of not recovering all of its costs,[14] a fact that incumbents are quick to point out when they are bemoaning the risk of stranded investments as a result of competition. The opportunity to continue as the wholesale provider of UNEs—even where another competitor wins the retail customer's business—*reduces*

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12 Hausman Rebuttal at 9; Shelanski Rebuttal at 3-4.

13 Hausman Rebuttal at 9.

14 In making this statement, I do not mean to imply that the COLR obligation has imposed uncompensated costs on Verizon. Along with several other economists and policy analysts, I have elsewhere testified that the COLR obligation has conferred at least as many opportunities on Verizon and other incumbents as it has imposed obligations.

Verizon's risk of not recovering the full cost of its investments, rather than adds to that risk.

Q. WOULD DR. HAUSMAN'S RECOMMENDED MARKUPS PRODUCE UNE PRICES THAT LEAD TO SOCIALLY DESIRABLE INVESTMENT DECISIONS ON THE PART OF NEW ENTRANTS?

A. No. In the publication that Dr. Hausman himself cites, Dr. Baumol characterized the view that UNE prices should be higher than they would otherwise be if the incumbents' foregone option value were not taken into account as an "all-too-easy conclusion" that "ignores two vital considerations."[15] I have already discussed the first of these two considerations, namely, that allowing competitors access to UNEs "is likely to require little, if any, expanded investment commitment" on the part of the incumbent.[16] I will now elaborate on the second of Dr. Baumol's considerations, which is that an increase in UNE prices could accelerate competitors' commitments to invest in facilities, which themselves have a foregone options value.[17] Ironically, prior to the passage of the Telecommunications Act of 1996 ("Act"), concerns about uneconomic bypass[18]—

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15 Baumol, 1999, at 217.

16 *Id.*

17 *Id.*

18 The term "uneconomic bypass" refers to a situation in which a potential customer—in this case, the potential UNE purchaser—of a utility's services chooses to "bypass" the utility and obtain the service or function in question through self-provisioning or from a third party even though the social cost of the alternative (self-provisioning or third-party service) exceeds the true social cost of the utility's service.

of which this risk is merely an extension—dominated incumbents' rhetoric about local competition.

Q. HOW COULD THE MARKUP THAT DR. HAUSMAN HAS PROPOSED LEAD TO OVERINVESTMENT BY COMPETITORS?

A. Dr. Hausman clearly intends for his markup factor to encourage competitors to invest in their own facilities, rather than to use Verizon's facilities.[19] Yet he does not seem to realize the possibility that the facilities-based entry that would result from pricing UNEs above TELRIC would be uneconomic, much less that the risk that he ascribes to the value of Verizon's existing plant from, *e.g.*, new wireless technologies would only be exacerbated if high UNE prices accelerate competitors' decisions to commit to building facilities that deploy such technology.[20]

High UNE prices may push competitors to build duplicative facilities even where Verizon has substantial excess capacity and can provide access to UNEs at a far lower social cost than the cost of constructing new facilities. Dr. Baumol observed that:

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19 Hausman Rebuttal at 9.

20 *Id.* at 8. Dr. Hausman's observation at this point in his rebuttal that "much of the ILEC network plant faces the risk of further advances in wireless telecommunication" is really a statement about the risk that Verizon faces as a result of the free option given to its *retail* customers, rather than a statement about the risk attributable to making access to UNEs available.

> [i]t is at least plausible that this sort of overinvestment—the natural extension of uneconomic bypass—is the more likely possibility. And it can indeed occur when some of the options values most likely to be relevant are overlooked.[21]

The relevant options values to which Dr. Baumol is referring are the options values associated with the competitors' investment commitments. In other words, in their single-minded focus on the options values associated with *Verizon's* investment decisions, Drs. Hausman and Shelanski have ignored the offsetting, and likely greater, social cost of premature commitment to investment by competitors and have thus incorrectly formulated the rule for cost-based UNE pricing.

Q. IS THERE ANY EVIDENCE THAT THIS RISK OF OVERINVESTMENT BY COMPETITORS IS A REAL ONE?

A. Yes. Dr. Tardiff has provided precisely such evidence in his rebuttal testimony, in which he cites a report by the Association for Local Telecommunications Services ("ALTS") that "CLECs invested over $55 billion in infrastructure nationwide between 1997 and 2000 and served about 16 million lines at the end of 2000, resulting in investment of about $3,000 per-line."[22] Dr. Tardiff uncritically treats this figure as a benchmark for the efficient forward-looking economic cost of providing the functionality that AT&T and WorldCom have modeled using the

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21 Baumol, 1999, at 218.

Synthesis Model.[23] However, an equally, if not more, plausible interpretation of the significant difference between the ALTS and Synthesis Model per-line investments is that the ALTS figures represent investment in facilities that are not being utilized at anything approaching the capacity that they were designed to serve. The substantial number of new entrants that have filed for bankruptcy, or are in severe financial distress,[24] lend credence to this interpretation. Significantly, this kind of overinvestment (most of which is likely investment in facilities to serve what are potentially the most profitable segments of the local exchange market—large business customers in central business districts) is precisely what one would predict as a result of high UNE prices that fail to take into consideration the foregone value of *new entrants' option to postpone investment.*

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22 Tardiff Rebuttal at 39, footnote omitted.

23 Dr. Tardiff also ignores the self-evident fact that the comparison he is making involves apples and oranges. The quotation from ALTS that appears in footnote 30 of Dr. Tardiff's rebuttal makes clear that the over $55 billion investment includes investment to provide data services and thus almost certainly includes equipment such as Digital Subscriber Line Access Multiplexers ("DSLAMs") whose cost is intentionally excluded from the Synthesis Model results to which he compares the ALTS figures.

24 *See, for example,* Verizon VA Response to AT&T/WCOM 7-98, indicating that there are 302 collocation arrangements in Virginia leased by CLECs that are either operating under bankruptcy protection or have declared bankruptcy. This is approximately 30% of the total collocation arrangements that Verizon witness Mr. West stated are in place in Virginia as of May, 2001. West Direct at 3.

Q. DR. HAUSMAN AND OTHER VERIZON WITNESSES REPEATEDLY EMPHASIZE THE CONCERNS THAT EXCESSIVELY LOW UNE PRICES WILL ENCOURAGE INEFFICIENT UNE-BASED ENTRY AND DISCOURAGE COMPETITORS FROM BUILDING THEIR OWN FACILITIES.[25] ARE THESE THE PRIMARY POLICY CONCERNS THAT SHOULD INFLUENCE THE COMMISSION'S PRICING DECISIONS IN THIS ARBITRATION?

A. No. I do not advocate that the Commission deliberately depart from cost-based pricing; however, I strongly disagree with the apparent assumption of Verizon's economic witnesses that the Commission should take special care to avoid underpricing UNEs. Any reasonable person looking at the state of local competition in Virginia—and, indeed, through the country—must conclude that incumbent local exchange carriers such as Verizon maintain a near-stranglehold on local markets. Although competitors have made multibillion dollar investments in facilities to serve areas with concentrated demand, such as the financial centers of major metropolitan areas, the immediate prospects for widespread facilities-based entry appear to be dim, especially with respect to local service for residential and small business customers. Resale has yet to prove a successful entry strategy. Thus, the best hope for widespread local competition in the near-term is clearly UNE-based competition. Under these circumstances, the Commission should take special care not to *overprice* UNEs and thereby to choke

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25 *See, for example,* Shelanski Rebuttal at 3; Hausman Rebuttal at 9; Tardiff Rebuttal at 9.

off the only realistic challenge to Verizon's near-monopoly control of Virginia's local exchange markets.

Q. VERIZON HAS ARGUED THAT COMPETITION IS ALIVE AND WELL IN VIRGINIA. WHY DO YOU SAY THAT VERIZON HAS NEAR-MONOPOLY CONTROL OF VIRGINIA'S LOCAL EXCHANGE MARKETS?

A. Even the most cursory review of the available Virginia market share data suggests that Verizon continues to dominate the market. Table 1 below provides an overview of the status of Virginia's local exchange markets as of year-end 2000. A comparison of Verizon VA's physical pair count to the total lines served by UNE-based and resale competitors indicates that Verizon retains approximately a 96% share of the total access lines in its service territory in Virginia, despite entry by numerous Competitive Local Exchange Carriers ("CLECs") during the more than five years since the passage of the Act.[26] As Verizon's high share of access lines suggests, application of traditional measures of market concentration to the Virginia local exchange market data produces virtually the same result that one would obtain if a single firm controlled the entire market. For example, the

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26 I did not have data for access lines served by facilities-based competitors; however, I would not expect that figure to change the analysis substantially. For example, Verizon witness Mr. West cited approximately a 9% market share for all Virginia CLECs in his direct testimony. West Direct at 4.

Virginia data produce a Hirschman-Herfindahl Index ("HHI")[27] score of over 9,200, which is only slightly lower than the maximum HHI of 10,000 attributable to a *pure monopoly*. To put this figure in perspective, the Department of Justice and Federal Trade Commission consider any market with an HHI of over 1,800 to be highly concentrated.[28]

Table 1

Virginia Local Exchange Market Concentration

	2000 Lines	**Market Share**	**HHI**
Verizon VA[29]	4,098,761	96%	9,203
CLECs[30]	173,783	4%	4
Total	4,272,544	100%	9,207

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27 The HHI is a widely recognized measure of market concentration and is used by the Department of Justice ("DoJ") and Federal Trade Commission ("FTC") in both merger and antitrust analyses. *See* the DoJ/FTC Horizontal Merger Guidelines, Section 1.5, http://www.usdoj.gov/atr/public/guidelines/horiz_book/15.html

28 *Id.*

29 Line count for Verizon VA represents physical pair count because Verizon did not indicate which reporting method was used in its data response concerning CLEC line count data (*see* following footnote).

30 *See* Verizon VA Response to AT&T/WCOM 6-134.

Q. THE DATA IN TABLE 1 ARE FOR THE YEAR 2000. DO YOU BELIEVE THAT THE COMPETITIVE SITUATION IN VIRGINIA HAS IMPROVED DURING 2001 OR WILL IMPROVE SIGNIFICANTLY IN THE NEAR FUTURE?

A. No. The economic viability of the CLECs that have entered the Virginia market is clearly in question, with several of these firms operating under or facing bankruptcy.[31] Furthermore, even if CLEC lines were to increase at an implausible and unsustainable annual growth rate of 25%, while Verizon's line count remained static at its year-end 2000 level, it would take nearly fifteen years for Verizon's market share to be reduced to 50% of the total Virginia market.

Q. HOW WOULD VERIZON'S UNE PRICING RECOMMENDATIONS AFFECT COMPETITION IN VIRGINIA?

A. Verizon's UNE pricing recommendations would preserve the company's near-monopoly market share by making UNE-based entry infeasible, particularly for residential customers in the suburban and rural areas of Virginia. The differences between the statewide-average price for basic residential service and the deaveraged UNE prices that Verizon seeks to charge competitors are substantial. Verizon's proposed UNE loop plus switch port prices in Zones 1, 2 and 3 total $22.64, $32.84 and $52.08 respectively. Therefore, even before a competitor paid a penny for switching or transport usage in a UNE-P arrangement (the typical entry vehicle to serve residential customers), that competitor would already have

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31 *See* Verizon VA Response to AT&T/WCOM 7-98.

to pay Verizon far more for UNEs than residential customers pay for retail local exchange service plus the Subscriber Line Charge ("SLC"). The recommendations of Verizon's economic witnesses would only exacerbate the overriding economic and policy problem facing this Commission—the dismal state of competition in Verizon's Virginia service territory.

In summary, marking up UNE prices as Dr. Hausman has proposed could lead to overinvestment in facilities-based entry where the cost of entry is relatively low compared to current retail prices and would likely forestall entry altogether for most residential and small business market segments. Because the requirement to provide access to UNEs does not drive Verizon's investment decisions, there are few, if any, social benefits of Dr. Hausman's proposal to offset these undeniable social costs.

B. THIS COMMISSION HAS ALREADY REJECTED DR. HAUSMAN'S PROPOSED USE OF REAL OPTIONS THEORY TO DERIVE A "MARKUP" TO TELRIC-BASED UNE PRICES.

Q. HAS THIS COMMISSION PREVIOUSLY CONSIDERED DR. HAUSMAN'S PROPOSAL TO INCREASE TELRIC-BASED UNE PRICES BY A "MARKUP" DESIGNED TO ACCOUNT FOR THE ALLEGEDLY SUNK AND IRREVERSIBLE NATURE OF INVESTMENTS IN TELECOMMUNICATIONS INFRASTRUCTURE, AS WELL AS THE ALLEGED OMISSION OF CHANGES IN THE PRICE OF CAPITAL GOODS FROM DEPRECIATION RATES?

A. Yes, it has. Dr. Hausman's current proposal is conceptually the same as the one that he advanced on behalf of USTA in the proceedings concluding in the Commission's *Local Competition First Report and Order*. Indeed, in response to

AT&T/WCOM 10-51, Verizon admitted that "[t]he theoretical argument that sunk costs need to be taken into account is similar to the arguments [Dr. Hausman] made in Docket No. 96-98."

Q. DID THE COMMISSION AGREE WITH DR. HAUSMAN'S CONCEPTUAL APPLICATION OF REAL OPTIONS THEORY IN DOCKET NO. 96-98?

A. No. The Commission specifically rejected Dr. Hausman's contention that a markup above properly calculated Total Service Long Run Incremental Cost ("TSLRIC") or TELRIC, in the case of UNEs, would be necessary to account for the effects of the phenomena that Dr. Hausman discussed in his 1996 Affidavit on behalf of USTA and has reiterated in his rebuttal testimony on behalf of Verizon in this arbitration. For example, the Commission observed in ¶ 686 of its *Local Competition First Report and Order* that:

> We agree with USTA, Bell Atlantic, and BellSouth that, as a theoretical matter, the combination of significant sunk investment, declining technology costs, and competitive entry may increase the depreciation costs and cost of capital of incumbent LECs. We do not agree, however, that TSLRIC does not or cannot account for risks that an incumbent LEC incurs because it has sunk investments in facilities. On the contrary, properly designed depreciation schedules should account for expected declines in the value of capital goods.

As AT&T/WorldCom witness Mr. Richard Lee explains further in his concurrently filed surrebuttal testimony, the cost results that AT&T and WorldCom have sponsored in this arbitration incorporate depreciation assumptions that this Commission has determined to reflect appropriate economic

lives, taking into account all relevant factors, including changes in the price of capital goods.

Similarly, in ¶ 688, this Commission took strong exception to Dr. Hausman's arguments concerning the cost of capital used in forward-looking costing methodologies, stating that:

> We are not persuaded by USTA's argument that forward looking methodologies fail to adjust the cost of capital to reflect the risks associated with irreversible investments and that they are "biased downward by a factor of three." First, USTA's argument unrealistically assumes that competitive entry would be instantaneous. The more reasonable assumption of entry occurring over time will reduce the costs associated with sunk investment. Second, we find it unlikely that investment in communications equipment is entirely irreversible or that such equipment would become valueless once facilities-based competition begins. In a growing market, there most likely would be demand for at least some embedded telecommunications equipment, which would therefore retain its value.

Time has certainly shown the Commission to be right in both respects. Competitive entry has been gradual, to say the least, with Verizon retaining a 96% market share of total access lines in Virginia to date. Nor are the incumbents' embedded telecommunications equipment investments entirely irreversible. To the contrary, as I will discuss further below, the extent of sunk and irreversible investments is likely far lower than Verizon has assumed. Moreover, as AT&T/WorldCom witness Mr. John I. Hirshleifer explains further in his concurrently filed surrebuttal testimony, the cost results that AT&T and WorldCom are sponsoring in this arbitration reflect a weighted cost of capital that is sufficient to compensate Verizon for the investor-required return on its assets.

Dr. Hausman's assertion that "breakeven" with the investor-required return on assets is not sufficient compensation to induce Verizon to continue investing in its network[32] is simply a reformulation of a position that he took in 1996, and that this Commission has already rejected. Specifically, in ¶ 689 of its *Local Competition First Report and Order*, the Commission considered evidence that the minimum acceptable expected return on investment (the "hurdle rate") that firms apply in deciding whether to move forward with new projects exceeds the market cost of capital and determined that the evidence did not convincingly support Dr. Hausman's proposal. The Commission stated its findings as follows:

> Finally, we are not persuaded that the use by firms of hurdle rates that exceed the market cost of capital is convincing evidence that sunk investments significantly increase a firm's cost of capital. An alternative explanation for this phenomenon is that the process that firms use to choose among investment projects results in overestimates of their returns. Firms therefore use hurdle rates in excess of the market cost of capital to account for these overestimates. [Footnote omitted.]

Q. IS THERE ANYTHING NEW IN DR. HAUSMAN'S REBUTTAL TESTIMONY THAT SHOULD LEAD THE COMMISSION TO REACH DIFFERENT CONCLUSIONS FROM THE ONES IT REACHED IN ITS *LOCAL COMPETITION FIRST REPORT AND ORDER*?

A. No. In response to AT&T/WCOM 10-51, Verizon has attempted to portray Dr. Hausman's current testimony as being different from his arguments in Docket No. 96-98 in that "the computations and application are new and applied specifically

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32 Hausman Rebuttal at 20.

to Verizon VA network data, as well as the Modified Synthesis Model." There is nothing unique about Verizon VA network data that makes Dr. Hausman's conceptual approach valid when applied to this set of facts, when the Commission has already found that his approach is invalid when applied to the general circumstance of forward-looking economic cost studies for UNEs. Furthermore, as I will show in detail in the following section of my surrebuttal testimony, Dr. Hausman's application of real options theory to what he calls the Modified Synthesis Model, or MSM, rests on erroneous assumptions that lead him to calculate invalid "markup" factors. Therefore, the Commission should reject both Dr. Hausman's conceptual approach and his specific proposed "markups" in this arbitration, just as it rejected his conceptual approach in Docket No. 96-98.

Q. ARE YOU SAYING THAT THE COMMISSION SHOULD IGNORE THE EFFECTS OF SUNK AND IRREVERSIBLE INVESTMENTS IN SETTING UNE PRICES?

A. No. I am saying that the Commission should stand by its conclusion that the correct way to address this issue is by adopting TELRIC-based cost results that reflect a reasonable market-based cost of capital and appropriate economic depreciation lives.[33]

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33 *Local Competition First Report and Order* at ¶ 703.

C. DR. HAUSMAN'S PROPOSED "MARKUPS" REFLECT ERRONEOUS ASSUMPTIONS CONCERNING THE BASIS FOR THE AT&T/WORLDCOM COST RESULTS.

Q. IN YOUR PREVIOUS ANSWER, YOU INDICATED THAT DR. HAUSMAN HAS MADE SEVERAL ERRONEOUS ASSUMPTIONS CONCERNING THE BASIS FOR THE AT&T/WORLDCOM COST RESULTS. WHAT SPECIFIC ERRORS HAS DR. HAUSMAN MADE?

A. Dr. Hausman has made numerous errors, including the following:

- He erroneously concludes—based, apparently, only on Dr. Tardiff's mischaracterization of the Synthesis Model[34]—that, "[i]n effect, the MSM model assumes that all the current network plant becomes stranded after several years, when it is replaced by the newest and most efficient technology that exists."[35] Dr. Hausman, along with other Verizon witnesses, here displays a fundamental misunderstanding of the purpose of cost modeling. AT&T and WorldCom have used the Synthesis Model to estimate the forward-looking economic costs that an efficient competitor entering the market for the first time would experience if that firm served the entire current and reasonably foreseeable demand that the incumbent serves.[36] The intent of modeling costs in this manner is to mimic the

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34 Hausman Rebuttal at 5.

35 *Id.* at 6. Dr. Shelanski makes the same, inaccurate assumption. *See* Shelanski Rebuttal at 4.

36 Consistent with the requirements of TELRIC, AT&T and WorldCom have imposed the constraint that the competitor must serve demand using the incumbent's existing wire center locations, rather than determining the least-cost number and placement of central (continued)

pricing outcomes that one would expect in a competitive market, not to replicate the physical plant that an incumbent local exchange carrier would rely upon at any point in time to provide retail local service and UNEs. AT&T and WorldCom have not assumed that Verizon will actually replace all of its plant in service every three years, as Verizon's economic witnesses incorrectly suggest. Indeed, as I explained at length in my rebuttal testimony, the incumbent would very likely continue to use its embedded plant for some time after a more efficient new technology becomes available. However, as Verizon witness Dr. Shelanski acknowledged in his direct testimony, the effect of the new technology is to decrease the *value* of the older plant in a way that makes the economic cost of owning and operating the older plant equal to the economic cost of owning and operating the efficient new technology.[37] (Of course, new technology does not always devalue incumbents' existing plant. For example, the advent of Digital Subscriber Line technology has most likely

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offices. As the Commission has recognized, this constraint means that TELRIC does not represent the lowest possible forward-looking economic cost that a new entrant could achieve and leaves room for facilities-based competitors to enter the market and underprice the incumbent. *Local Competition First Report and Order* at ¶ 685.

37 *See* Shelanski Direct at 34. *See* Richard N. Clarke, "Rethinking the Implications of 'Real Options' Theory for the U.S. Local Telephone Industry," in J. Alleman and E. Noam, eds., *The New Investment Theory of Real Options and its Implications for Telecommunications Economics*, 1999, at 223 (hereafter, Clarke, 1999). For the (continued)

extended the economic life and increased the economic value of the incumbents' existing copper plant by enabling that plant to provide higher-bandwidth services than were previously possible.) The important point is that modeling the incumbent's cost *as if* the incumbent replaced its existing plant with the most efficient technology currently available provides a reasonable proxy of the forward-looking economic cost of owning and operating the incumbent's existing plant and equipment.

- Dr. Hausman also erroneously assumes that AT&T and WorldCom have modeled costs as if both current and future demand were known with certainty (*i.e.*, the network was "perfectly planned") and all investments were utilized at "planned capacity."[38] To the contrary, as Mr. Pitkin demonstrates in his concurrently filed surrebuttal testimony, the AT&T/WorldCom UNE cost results include the costs of carrying a substantial amount of spare capacity that can accommodate growth and/or "churn." I will address the issue of the proper treatment of growth further below.
- Dr. Hausman has incorrectly claimed that AT&T and WorldCom have relied on "regulatory" depreciation lives that fail to consider decreases in

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Commission's convenience, I have also included the full text of Dr. Clarke's chapter in Attachment A to this surrebuttal testimony.

38 Hausman Rebuttal at 5-6.

the prices of capital goods.[39] To the contrary, the depreciation lives used in the AT&T/WorldCom Synthesis Model runs are the most recent FCC prescription lives for Verizon VA. In establishing a range of depreciation lives for equipment such as digital switches, this Commission has explicitly considered the possibility of future decreases in the price of the capital goods.[40] The depreciation lives that AT&T and WorldCom have used in the Synthesis Model for equipment such as digital switches and digital circuit equipment that may be subject to further price declines fall within the range that the FCC has most recently established for these categories of plant. If Verizon truly believes that the current approved switching lives in Virginia exceed economic depreciation lives, it has the option to request that the Commission adopt new depreciation lives that are closer to the bottom end of the most recent Commission-approved range. Significantly, Verizon VA has not sought such represcription. Moreover, as AT&T/WorldCom witness Mr. Lee discusses further in his surrebuttal testimony, the fact that Verizon's depreciation reserves are growing, rather than declining, strongly suggests that the current

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39 *Id.* at 13-14.

40 FCC 99-397, 1998 Biennial Regulatory Review-Review of Depreciation Requirements for Incumbent Local Exchange Carriers, CC Docket 98-137, Report and Order, (rel. Dec. 30, 1999), ¶¶ 13-19.

prescribed lives are more than adequate to compensate Verizon for the effects of economic depreciation.

- Dr. Hausman also incorrectly claims that "[t]he MSM model assumes that no technology risk exists."[41] To the contrary, AT&T and WorldCom have employed both economic depreciation assumptions that recognize technology risk—if they did not, there would be no difference between the economic life and the physical life of the assets in question—and a market-based cost of capital that reflects investors' perceptions of the effect of that technology risk on the future earnings of Verizon. Neither Dr. Hausman nor any other Verizon witness has provided any basis for the implausible assumption that investors have not factored such technology risk into their valuation of Verizon's stock. Mr. Hirshleifer discusses cost of capital issues further in his surrebuttal testimony and explains that the market-based cost of capital used in the AT&T/WorldCom cost modeling is sufficient to compensate Verizon for all relevant risks of providing UNEs in Virginia.

Q. ARE THERE OTHER KEY ERRORS IN DR. HAUSMAN'S ANALYSIS?

A. Yes. Even if Dr. Hausman were correct in all other respects, his proposed markups would be overstated because they reflect excessive estimates of the

extent to which Verizon's investments are sunk and irreversible. Verizon has overstated the extent of sunk and irreversible investments by (1) failing to consider the possibility that it could preserve at least a portion of its asset value by selling facilities in-place to another competitor and (2) exaggerating the magnitude of certain costs that it claims to be sunk.

Q. PLEASE EXPLAIN WHY VERIZON SHOULD HAVE CONSIDERED THE POSSIBILITY THAT IT COULD PRESERVE ASSET VALUE BY SELLING ASSETS IN-PLACE TO ANOTHER COMPETITOR.

A. Verizon's estimates of sunk and irreversible investments appear to include all investments that the company does not believe it could physically move to other locations where market conditions are more favorable. Dr. Hausman himself defines sunk investments as "investments that cannot be redeployed if the project is not successful"[42] and contrasts them with the investments in a perfectly contestable market, in which, "if the return on an investment decreases below the competitive return, the investment is immediately removed from the market and used elsewhere."[43] What neither Dr. Hausman nor Verizon seems to have consider is that investments can be redeployed *financially*, rather than *physically*, by the transfer of assets from one firm to another. Dr. Richard N. Clarke raised

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41 Hausman Rebuttal at 8.

42 *Id.* at 6.

43 *Id.* at 7.

precisely this point, again, in the publication that Dr. Hausman misleadingly cites as support for the proposition that "economists who have worked (and currently work) for AT&T have now recognized the importance of sunk costs and that TELRIC estimates are too low if they ignore the effect of sunk costs."[44] Dr. Clarke observed that "even outside-plant facilities that cannot be physically moved can be transferred to buyers who find these facilities more valuable than the ILEC. Indeed, the ILECs have transferred several million customer lines from one to another over the last five years."[45] Dr. Clarke goes on to conclude that "if ILEC investments are reversible from a financial perspective, they do not incorporate significant real options value."[46] This statement is but one example of the way in which Dr. Clarke differed with Dr. Hausman concerning the "parameter values" that are appropriate when applying real options theory to telecommunications pricing. Dr. Clarke also took issue with several other parameter values in the Hausman analysis, including the assumptions that (1) technical progress always devalues the incumbents' investments, (2) there are competitive "gains to waiting" and deferring investments, and (3) the terms and conditions under which incumbents offer UNEs are less favorable than the terms

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44 Hausman Rebuttal at 11, summarizing his review of both the Baumol and Clarke chapters that I have already discussed.

45 Clarke, 1999, at 222.

46 *Id.*

and conditions under which incumbents offer retail services and other types of wholesale access.[47] I have already discussed the first and third points, and agree with Dr. Clarke that the Hausman analysis makes incorrect assumptions. I also agree with Dr. Clarke that "first mover advantages" from committing to investments in new technology and being the first to deliver a new product to market may be more significant than the potential "gains to waiting."[48] As these examples illustrate, Dr. Clarke's differences with Dr. Hausman concerning "parameter values" are so profound that they lead to entirely different conclusions about whether real options values have any effect whatsoever on the correct economic pricing of UNEs.

Q. YOU ALSO SUGGESTED THAT VERIZON HAS EXAGGERATED CERTAIN COSTS THAT IT TREATS AS SUNK AND IRREVERSIBLE. WHAT IS THE BASIS FOR THIS STATEMENT?

A. Verizon has not provided any support for its estimate of sunk costs. Indeed, despite follow-up data requests, the only "workpapers" that Dr. Hausman and Verizon have provided for the estimates of sunk and irreversible investments show an inventory of the investments that Verizon deems to be sunk. These so-called "workpapers" are devoid of any analysis or explanation as to why Verizon considers these investments to represent sunk and irreversible costs.

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47 *Id.* at 221-224.

48 *Id.* at 223.

Many of these costs clearly are not sunk. For example, Dr. Hausman states that:

> [f]or switching and ports, Verizon VA estimates that about 40% of the investment is for costs such as engineering, furnishing, and installing, which are all sunk costs, and that about 50% of the investment in switching material is also sunk. Taken together, then, Verizon VA estimates that sunk costs represent 0.70 (70%) of the estimated total investment for switching and ports.[49]

The AT&T/WorldCom Recurring Cost Panel Rebuttal Testimony explained that Verizon's estimates of the costs for engineering, furnishing and installing switches ("E, F & I" costs) are severely overstated, which in turn leads to overstated estimates of sunk investments. Moreover, there is no reason that 50 percent of the investment in switching material (exclusive of E, F & I costs) would be sunk when switches are relatively fungible and can be redeployed in other locations.

Another instance in which Dr. Hausman has overstated the potential for sunk and irreversible investments is his example of the investment of an incumbent in a "new" fiber optic network capable of providing broadband services such as high-speed Internet access. Dr. Hausman's claim that much of the investment in such network upgrades would be sunk and irreversible[50] ignores

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49 Hausman Rebuttal at 18-19.

50 *Id.* at 7.

the reality that a significant portion of the investment in fiber feeder plant and Next Generation Digital Loop Carrier ("NGDLC") equipment that would be used to provision broadband services over fiber is *not* investment that is solely useful for broadband.[51] Instead, as SBC Communications, Inc., has noted with respect to its $6 billion investment in what it has dubbed as "Project Pronto," such network upgrades can pay for themselves in reduced operating expenses for basic voice-grade services[52]—savings that are available to the incumbent even if broadband demand does not materialize as expected. This example illustrates the need to consider a wide array of alternative uses of investments before declaring any investment to be sunk. Unfortunately, with the cursory information that Verizon has provided through Dr. Hausman's rebuttal testimony and subsequent discovery responses, it is impossible for parties or the Commission to assess the validity of most of Verizon's claims that investments are sunk and irreversible.

More generally, I note that Dr. Hausman has relied on estimates of the proportion of sunk investments included in *Verizon's recurring cost studies*, but then has used these estimates to derive markup factors that are allegedly

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51 Verizon VA Response to AT&T/WCOM 1-26.

52 An SBC *Investor Briefing* emphasizes that "SBC's new network investments will have a profound impact on its cost structure; in fact, the efficiencies SBC expects to gain will pay for the cost of the deployment on an NPV basis. These efficiencies are conservatively targeted to yield annual savings of about $1.5 billion by 2004 ($850 million in cash operating expense and $600 million in capital expenditures)." SBC (continued)

applicable to the Synthesis Model, which calculates very different costs from Verizon's studies. Neither Dr. Hausman nor Verizon has provided any documentation or analysis to suggest that percentages derived from the Verizon cost studies are relevant to the AT&T/WorldCom Synthesis Model results.

III. CONTRARY TO DR. TARDIFF'S ALLEGATIONS, THE CONCEPTUAL APPROACH THAT AT&T AND WORLDCOM HAVE EMPLOYED TO DEVELOP UNE PRICES APPROPRIATELY REFLECTS THE FACTORS THAT WOULD DETERMINE PRICES FOR THOSE FUNCTIONS IN A COMPETITIVE MARKET.

A. THE VALIDATION TESTS DR. TARDIFF PROPOSES ARE INAPPROPRIATE BENCHMARKS FOR MEASURING THE REASONABLENESS OF THE AT&T/WORLDCOM COST RESULTS.

Q. DR. TARDIFF PROPOSES A SERIES OF TESTS THAT HE CLAIMS ARE RELEVANT TO THE DETERMINATION OF THE REASONABLENESS OF THE SYNTHESIS MODEL RESULTS SUBMITTED IN THIS PROCEEDING.[53] DO HIS PROPOSED TESTS PROVIDE APPROPRIATE BENCHMARKS FOR THE REASONABLENESS OF THE COST BASIS FOR UNE PRICING?

A. No. I have already explained why Dr. Tardiff's comparison of the Synthesis Model results to the per-line investment implied by an ALTS report is inappropriate. His other "validity tests" are equally inappropriate, as I will show below and as Mr. Pitkin demonstrates further in his surrebuttal testimony.

Investor Briefing, "SBC Announces Sweeping Broadband Initiative," October 18, 1999, at 7.

53 Tardiff Rebuttal, Section IV.